List of Potential LBAM Eradication Tools

I. Insecticide sprays
- A. Synthetic Insecticides
  - 1. Carbamates, pryethroids, organophosphates
- B. Botanical Insecticides
  - 1. Pyrethrum, neem extracts, ryania
- C. Insect Growth Regulators
  - 1. Dimilin, methoprene and tebufenozide
- D. Insect Pathogens
  - 1. Bacillus thuringiensis and nuclear polyhedrosis virus
- E. Biopesticides
  - 1. Spinosad

II. Natural Enemies
- A. Inundative Releases
  1. Parasites
  2. Predators
- B. Classical Biological Control
  1. predators
  2. parasites

III. Use of LBAM Pheromones
- A. Mass Trapping
- B. Mating Disruption
  1. Twist ties, microencapsulated pheromone, puffers, flakes and inert carriers
- C. Attract and Kill
- D. Mobile Mating Disruption

IV. Cultural Methods
- A. Trap Plants
- B. Physical Removal of LBAM Life Stages
- C. Host Removal
- D. Repellents

V. Sterile Insect Technique
    A. Inherited Sterility

    B. Sterile Moth Release

VI. Integrated Pest Management

VII. Regulatory Control
    A. Quarantines and Hold Notices

Description of Tools Considered for Use in the LBAM Eradication Program

I. Insecticide Sprays

Tool: Foliar Sprays of Synthetic Insecticides

Efficacious against LBAM	yes
Available Now	yes
Available March 2008	yes
Available September 2008	yes
Available 2009	yes
Available 2010	yes

Description of tool: Synthetic insecticides (carbamates, organophosphates, pyrethriods) are sprayed on plants. LBAM larvae are killed by contacting the insecticides and/or ingesting them while eating treated foliage. Full coverage of target plants is necessary to maximize the effectiveness of the insecticides.

Examples of tool use: A number of synthetic insecticides are recommended for use against LBAM in New Zealand and Australia including carbaryl, diazinon and peremethrin. Carbaryl has been used by CDFA in Diaprepes root weevil, gypsy moth, Japanese beetle and glassy-winged sharpshooter eradication programs.

Applicable to LBAM Eradication Program: Synthetic insecticides could be incorporated immediately into the LBAM eradication program. There are ground and aerial technologies available for the application of these insecticides.

Research Needed: None

Tool: Foliar Sprays of Botanical Insecticides

Efficacious against LBAM	yes-some
Available Now	yes
Available March 2008	yes
Available September 2008	yes
Available 2009	yes
Available 2010	yes

Description of tool: Botanical insecticides (ryania and neem extracts) are sprayed on plants. LBAM larvae are killed by ingesting them while eating treated foliage. Full coverage of target plants is necessary to maximize the effectiveness of the insecticides.

Examples of tool use: Several botanical insecticides are recommended for use against LBAM in New Zealand and Australia including ryania and pyrethrum. Pyrethrum is mixed with PBO (piperonyl butoxide) to increase its effectiveness.

Applicable to LBAM Eradication Program: Effective botanical insecticides could be considered for incorporated into the LBAM eradication program after reviewing their

registration status. There are ground and aerial technologies available for the application of these insecticides.

Research Needed: None

Tool: Foliar Sprays of Insect Growth Regulators

Efficacious against LBAM	yes
Available Now	yes
Available March 2008	yes
Available September 2008	yes
Available 2009	yes
Available 2010	yes

Description of tool: Insect Growth Regulators (Dimilin and methoprene) are sprayed on plants. LBAM larvae ingest them while eating treated foliage. Exposed larvae are unable to molt or develop properly. Full coverage of target plants is necessary to maximize the effectiveness of the insecticides.

Examples of tool use: Several Insect Growth Regulators are recommended for use against LBAM in New Zealand and Australia including Dimilin and Mimic (tebufenozide).

Applicable to LBAM Eradication Program: Insect Growth Regulator could be incorporated immediately into the LBAM eradication program. There are ground and aerial technologies available for the application of these insecticides.

Research Needed: None

Tool: Foliar Sprays of Insect Pathogens

Efficacious against LBAM	yes
Available Now	yes
Available March 2008	yes
Available September 2008	yes
Available 2009	yes
Available 2010	yes

Description of tool: Insect pathogens (Bacillus thuringiensis and nuclear polyhedrosis virus) are sprayed on plants. LBAM larvae ingest them while eating treated foliage. Exposed larvae are killed by infection of the pathogen. Full coverage of target plants is necessary to maximize the effectiveness of the insecticides.

Examples of tool use: The caterpillar pathogen Bacillus thuringiensis recommended for use against LBAM in New Zealand and Australia. A nuclear polyhedrosis virus is known from LBAM but it not commercially available.

Applicable to LBAM Eradication Program: Bacillus thuringiensis was initially used to treat outlier infestations before mating disruption was available. Bacillus thuringiensis could be immediately re-incorporated into the LBAM eradication program. There are ground and aerial technologies available for the application of this insecticide.

Research Needed: None

Tool: Foliar Sprays of Biopesticides

Efficacious against LBAM	yes
Available Now	yes
Available March 2008	yes
Available September 2008	yes
Available 2009	yes
Available 2010	yes

Description of tool: Biopesticides (Spinosad) are sprayed on plants. LBAM larvae are killed by ingesting them while eating treated foliage. Full coverage of target plants is necessary to maximize the effectiveness of the insecticide.

Examples of tool use: Spinosad is recommended for use against LBAM in New Zealand and Australia.

Applicable to LBAM Eradication Program: Biopesticides could be incorporated immediately into the LBAM eradication program. There are ground and aerial technologies available for the application of this insecticide.

Research Needed: None

II. Natural Enemies

Tool: Inundative Releases of Parasites

Efficacious against LBAM	likely
Available Now	no
Available March 2008	possibly
Available September 2008	probably
Available 2009	yes
Available 2010	yes

Description of tool: Large numbers of parasites of the target pest are released in an effort to temporarily reduce pest numbers. Typically used in situations where existing natural enemies are unable to reduce pest numbers to tolerable levels. Inundative releases must be periodically repeated to provide long-term control.

Examples of tool use: Trichogramma wasps are commonly used to control caterpillar eggs on crops in Asia and Europe and Encarsia wasps are used in greenhouses to control greenhouse whitefly (nature.berkeley.edu/biocon/BC%20class%20notes/141-144%20augmentation). Both ground and aerial release systems for Trichogramma wasp are available (cdpr.ca.gov/docs/pestmgt/grants/99-00/finlrpts/99-0217). Trichogramma wasps are used against LBAM in Australian crops (raa.nsw.gov.au/reader/oppg-2006-full.pdf?mlvaobj=27541&doctype=document&mltyobj=application).

Applicable to LBAM Eradication Program: It is likely that the release of large numbers of Trichogramma wasps is be a strategy that would be an effective part of future eradication treatments of LBAM. If effective (see Research Needs below), the CDFA and USDA will need to determine how best to integrate this tool into the LBAM eradication program.

Research Needed: Develop an LBAM colony in California in containment (in progress), test ability of available Trichogramma wasp species to attack LBAM eggs and develop into viable adults, and determine release strategy in containment

Tool: Inundative Releases of Predators

Efficacious against LBAM	unlikely
Available Now	yes
Available March 2008	yes
Available September 2008	yes
Available 2009	yes
Available 2010	yes

Description of tool: Large numbers of generalist predators of the target pest are released in an effort to temporarily reduce pest numbers. Typically used in situations where existing natural enemies are unable to reduce pest numbers to tolerable levels. Inundative releases must be periodically repeated to provide long-term control.

Examples of tool use: Predatory mites, green lacewings and lady bird beetles are commonly used predators in inundative release programs (nature.berkeley.edu/biocon/BC%20class%20notes/141-144%20augmentation). Generalist predators eat the most common food source first and their releases work best when the target pest is the most common food available.

Applicable to LBAM Eradication Program: It is unlikely that the release of large numbers of generalist predators would be an effective part of future eradication treatments of LBAM. These predators eat the most common food sources first and will not focus on LBAM. There are non-target concerns with the use of generalist predators.

Research Needed: None

Tool: Classical Biological Control- Parasites

Efficacious against LBAM	likely

Available Now	no
Available March 2008	no
Available September 2008	no
Available 2009	possibly
Available 2010	probably

Description of tool: Parasites of the target pest are imported into California and released. If they establish breeding populations, it is hoped that they will permanently reduce target pest numbers below damaging levels. Smaller numbers of wasps are released than in inundative releases and once the wasps are established, releases cease.

Examples of tool use: The CDFA has had several recent successful biological control programs using parasites including pink hibiscus mealybug and ash whitefly (cdfa.ca.gov/phpps/ipc/biocontrol/83pinkhibscusmealybug and cdfa.ca.gov/phpps/ipc/biocontrol/83ashwhitefly). **Biological control does not eradicate the target pest.**

Applicable to LBAM Eradication Program: If eradication is unsuccessful, biological control is the next option. There are a number of parasite wasps that attack LBAM in Australia and New Zealand.

Research Needed: Biological control is not eradicative of the target pest. Develop an LBAM colony in California in containment (in progress), import and establish colonies of LBAM attacking parasites from Australia and New Zealand into quarantine (in progress), develop colonies of other leafrollers found in California (in progress), test ability of wasp species from Australia and New Zealand to attack California LBAM in quarantine, determine ability of these wasp species to attack other leafrollers found in California in quarantine, and obtain USDA permit to release these wasp species.

Tool: Classical Biological Control- Predators

Efficacious against LBAM	unlikely
Available Now	no
Available March 2008	no
Available September 2008	no
Available 2009	no
Available 2010	no

Description of tool: Predators of the target pest are imported into California and released. If they establish breeding populations, it is hoped that they will permanently reduce target pest numbers below damaging levels. Smaller numbers of predators are released than in inundative releases and once the predators are established, releases cease. In general, predators of moths are not specific enough to affect biological control (see discussion Inundative Releases of Predators above) (IPM.davis.edu/PMG/r8300211). There are non-target concerns with the use of generalist predators.). **Biological control does not eradicate the target pest.**

Examples of tool use: The CDFA has had several successful biological control programs using predators including cottony cushion scale (IPM.davis.edu/PMG/r107301611).

Applicable to LBAM Eradication Program: If eradication is unsuccessful, biological control is the next option. However, the use of parasitic wasps appears to offer a greater probability of success than the use of LBAM predators. There are non-target concerns with the use of generalist predators.). **Biological control does not eradicate the target pest.**

Research Needed: None

III. Use of LBAM Pheromone

Tool: Mass Trapping

Efficacious against LBAM	likely
Available Now	yes
Available March 2008	yes
Available September 2008	yes
Available 2009	yes
Available 2010	yes

Description of tool: Large numbers of traps, baited with a strong lure are placed in an area in an effort to catch (trap out) sufficient numbers of the target pest to cause the population to decrease. Works best when the pest has a highly effective lure and there is a time interval between adult emergence and their becoming sexually active during which the adults are attracted to the lure. Either an insecticide is placed in the trap to kill the captured insects or a sticky insert is used to catch and kill them.

Examples of tool use: The CDFA has used mass trapping as the primary tool in its melon fly eradication programs. The melon fly lure is very attractive and there is a five to seven day preovipositional period during which the male melon flies are attracted to the lure. Mass trapping has been researched as a pest control method, but it has little use in commercial agriculture. Mass trapping has been used in small Gypsy moth eradication programs in California.

Applicable to LBAM Eradication Program: LBAM has the highly attractive lure, but the moths are able to mate within minutes to hours of adult emergence. It is unclear how many traps per unit area would be required to catch a large enough proportion of the LBAM population to affect a significant reduction in the numbers of the pest. There are operational difficulties in placing and retrieving large numbers of traps that might contain a pesticide in urban areas. Mass trapping might have a role in treating small LBAM infestations.

Research Needed: Develop relationship between trap density and proportion of LBAM population captured.

Tool: Mating (Pheromone) Disruption

Efficacious against LBAM	yes
Available Now	yes
Available March 2008	yes
Available September 2008	yes
Available 2009	yes
Available 2010	yes

Description of tool: An area is saturated with the sex pheromone of the target pest. This prevents the male insects from being able to follow individual pheromone plumes to the females and mate with them. The unmated females either lay no eggs or they lay infertile eggs and the population deceases.

Examples of tool use: Mating disruption is used against a number of moth pests including codling moth and oriental fruit moth (IPM.davis.edu/PMG/r603300111 and ipm/davis.edu/PMG/r602300211). Mating disruption is being used against the gypsy moth in the eastern United States (gmsts.org/operations/factsheet/002_gypsy%20moth%20mating%20disrupion). Mating disruption has been used successfully to control LBAM in New Zealand (maf.govt.nz/sff/about-projects/search/05-135). Several delivery systems can be used including twist ties, microencapsulated pheromone, puffer systems, flakes and inert carriers. The twist ties are manually applied to the plants to be protected. The microencapsulated pheromone, flakes and insert carriers can be applied onto the plants from the ground or the air. The puffer systems are mechanical units that periodically emit the pheromone into a crop environment.

Applicable to LBAM Eradication Program: Mating (pheromone) disruption is the primary tool being used against LBAM in the California eradication program.

Research Needed: None

Tool: Attract and Kill

Efficacious against LBAM	likely
Available Now	no
Available March 2008	possibly
Available September 2008	probably
Available 2009	yes
Available 2010	yes

Description of tool: A lure is used to draw the target insect to it where the insect dies after either feeding on the insecticide-lure mixture or crawling over the insecticide-lure mixture. Successful use of the tool requires a powerful lure to be effective.

Examples of tool use: The CDFA uses attract and kill as the primary eradication tool for fruit flies attracted to methyl eugenol including the oriental fruit fly (cdfa.ca.gov/phpps.pdep/treatment/oriental_ff)). This tool is being developed for other moth pests including the codling moth (phero.net/iobc/samos/bulletin/ioriatt). There are both ground and aerial application techniques.

Applicable to LBAM Eradication Program: Attract and kill technology likely will be a useful tool in the LBAM eradication program. There are operational questions about how to apply the material and how best to integrate the tool with other tools.

Research Needed: None

Tool: Mobile Mating Disruption

Efficacious against LBAM	unknown
Available Now	no
Available March 2008	no
Available September 2008	no
Available 2009	possibly
Available 2010	probably

Description of tool: An unrelated insect is used to saturate an area with the sex pheromone of the target pest. This prevents the male insects from being able to follow individual pheromone plumes to the females and mate with them. The unmated females either lay no eggs or they lay infertile eggs and the population deceases.

Examples of tool use: This is a novel concept that is only now being developed.

Applicable to LBAM Eradication Program: If effective, mobile mating disruption may be a useful addition to the tools used against LBAM. It could replace pheromone sprays as the technique to deliver the lure in mating disruption programs.

Research Needed: Demonstrate that the LBAM pheromone can be applied to a carrier insect (in progress), that the carrier insect's longevity is not reduced by the LBAM pheromone, that the male LBAM will respond to the pheromone on the carrier insect, that LBAM mating is disrupted by the presence of the LBAM pheromone covered carrier insects and the density of carrier insects per unit area needed to effect a high level of mating disruption.

IV. Cultural Methods

Tool: Trap Plants

Efficacious against LBAM	unlikely
Available Now	no
Available March 2008	no

Available September 2008	no
Available 2009	no
Available 2010	no

Description of tool: Trap plants are plants that are highly attractive to the target pest. They are planted near the crop to be protected and the target pest congregate in them. The trap plants are then treated with an insecticide to kill the target pest thus eliminating the need to treat the crop being protected. Trap plants can be highly preferred by the target pest for feeding or they can be preferred for resting outside the crop being protected.

Examples of tool use: Trap plants (crops or cropping) are used against a number of pests (oisat.org/cintrol-methods/cultural—practices/trap—cropping). These include planting alfalfa to attract lygus bugs to protect cotton crops. The lygus bugs prefer alfalfa to cotton and the bugs congregate in the alfalfa to feed.

Another example is the planting of corn or another tall grass provide melon fly females a resting or roosting area away from zucchini crops. The female melon flies rest in the grass around the perimeter of the zucchini field between periods when they lay their eggs in the zucchini fruit (ipmcenters.org/ipmsymposiumv/sessions/26-3).

Applicable to LBAM Eradication Program: It is unlikely that trap plants would be effective as a tool for the LBAM eradication program. LBAM moths feed on over 2000 different types of plants but they have not shown the strong preference to a limited number of these that would be necessary for them to act as trap plants. LBAM females do not roost in plants away from those in which they lay their eggs. Thus the LBAM does not exhibit either of the behavioral traits necessary for the successful use of trap plants.

Research Needed: None

Tool: Physical Removal of LBAM Life Stages

Efficacious against LBAM	unlikely
Available Now	yes
Available March 2008	yes
Available September 2008	yes
Available 2009	yes
Available 2010	yes

Description of tool: This would require the removal and destruction of LBAM life stages centered on the egg masses and larvae. Teams of workers would visually inspect all vegetation looking for LBAM egg masses and larvae and the workers would remove and destroy all those found.

Examples of tool use: Typically hand removal of insect pests is limited to small plots and larger or immobile pests (canr.msu.edu/vanburen/e-1863 and extension.oregonstate.edu/catalog/html/grow/grow/insects). It can be used against beetles on homegrown vegetable crops, tomato hornworms on homegrown tomato and leaf rollers on homegrown blueberries.

Applicable to LBAM Eradication Program: It is unlikely that physical removal of LBAM life stages would be effective as a tool for the LBAM eradication program. LBAM moths feed on over 2000 different types of plant including trees, shrubs and ground covers. Visual surveys will not find all the LBAM life stages, especially those high in tall trees and in dense foliage. There would be considerable disruption of the citizen's yards as teams of workers periodically swept through them looking for LBAM life stages and removing the foliage on which any were found.

Research Needed: None

Tool: Host removal

Efficacious against LBAM	unlikely
Available Now	yes
Available March 2008	yes
Available September 2008	yes
Available 2009	yes
Available 2010	yes

Description of tool: This would require the removal and destruction of all LBAM host plants. Teams of workers would visually inspect all vegetation looking for LBAM egg masses and larvae and the workers would remove and destroy all those found.

Examples of tool use: Typically removal of a pest's host plants is used to create a pest free zone by limiting the ability of the pest to traverse the host free area. It is applied to the area around which one is trying to exclude the pest. Host removal is often used in conjunction with other tools including pesticide sprays. Host removal is a key part of Florida's Caribbean fruit fly program for the export of grapefruit (doacs.state.fl.us/onestop/pit/cfffprotocol).

Applicable to LBAM Eradication Program: It is unlikely that physical removal of LBAM host plants would be effective as a tool for the LBAM eradication program. LBAM moths feed on over 2000 different types of plant including trees, shrubs and ground covers. The removal of all hosts would create large areas denuded of vegetation. There would be considerable disruption of the citizen's yards as teams of workers periodically swept through them removing all foliage.

Research Needed: None

Tool: Repellents

Efficacious against LBAM	possibly
Available Now	yes
Available March 2008	yes
Available September 2008	yes
Available 2009	yes
Available 2010	yes

Description of tool: There are materials that can be applied to plants that will repel pest insects from landing on them and then laying eggs or feeding. These repellents can be chemical like neem tree extracts or physical like the use of kaolin clay. Repellents are used to protect crops from attack by affected pests. They do not kill the pest or do they reduce pest numbers. They force the pests into adjacent areas away from the treated plants.

Examples of tool use: Kaolin clay can be used against leafhoppers on apples (attar.ncat.org/attar-pub/kaolin-clay-apples). Neem extracts can be used on a number of crops including cotton (newcrops.uq/edu.au/newslett/ncnl4-8).

Applicable to LBAM Eradication Program: Repellents have little use in the LBAM eradication program. They will not reduce LBAM numbers and at worst will enlarge the infested area by driving the pest away from treated sites.

Research Needed: None

V. Integrated Pest Management

Tool: Integrated Pest Management

Efficacious against LBAM	yes
Available Now	yes
Available March 2008	yes
Available September 2008	yes
Available 2009	yes
Available 2010	yes

Description of tool: Integrated pest management is an approach that uses of one or more tools to prevent pest numbers from reaching economically damaging levels. The keys to a successful Integrated Pest Management program are monitoring pest numbers, establishing a treatment threshold level to trigger actions that will prevent economic damage, selecting the appropriate tool to prevent pest numbers from reaching

economically damaging levels and recognizing that often some crop damage is acceptable.

Examples of tool use: Integrated Pest Management is used in nearly all crop systems in California (UC IPM Guides).

Applicable to LBAM Eradication Program: The LBAM program uses the key concepts of Integrated Pest Management. Traps are used to monitor LBAM numbers, a treatment threshold has been established to trigger treatments to prevent economic damage from occurring, and appropriate treatments have been selected to treat the LBAM. Where Integrated Pest Management *controls* pest numbers and believes that *some damage is acceptable*, the CDFA is *eradicating* the pest *to eliminate the need for any Integrated Pest Management program aimed at LBAM*.

Research Needed: See other tool descriptions

VI. Sterile Insect Technique

Tool: Inherited Sterility

Efficacious against LBAM	possibly
Available Now	no
Available March 2008	no
Available September 2008	no
Available 2009	possibly
Available 2010	probably

Description of tool: In moths, partially sterilized males when mated to fertile females produce completely sterile offspring. These offspring can mate with fertile moths and the resulting eggs are nearly all sterile.

Examples of tool use: Inherited sterility is still a concept that has limited use in pest control. The requirement that the target pest be allowed to breed and develop crop eating larvae for one generation before one sees any useful results has delayed its use in commercial agriculture. There are sufficient studies (Inherited Sterility in Insects by J. E. Carpenter, S. Bloem and F. Marec Chapter 2.4. in Sterile Insect Technique Principles and Practice in Area-wide Management) to conclude that the technique should work.

Applicable to LBAM Eradication Program: Inherited sterility could be a useful tool against LBAM. Fewer mass reared moths would be needed compared to sterile moth release (see below) and the released moths would result in a greater number of sterile moths in the next generation. The offspring's emergence would be synchronized with the

wild moth population. There is a low level of fertility in the offspring but it is unclear if it would be sufficient to sustain a viable LBAM population.

Research Needed: Determine level of radiation needed to partially sterilize the LBAM, develop a method to mass rear LBAM, build the LBAM mass rearing facility, develop methods to ship and release the LBAM and field test the concept.

Tool: Sterile Moth Release

Efficacious against LBAM	probably
Available Now	no
Available March 2008	no
Available September 2008	no
Available 2009	possibly
Available 2010	probably

Description of tool: Sterile moths are released over an area in numbers great enough to ensure that all or nearly all wild female moths mate with sterile male moths. The resulting eggs are sterile.

Examples of tool use: The CDFA successfully uses sterile fly releases against the Mediterranean and Mexican fruit flies and sterile moths against the pink bollworm. For the Mediterranean and Mexican fruit flies, pesticide applications are used to kill fertile female flies present and to reduce the population of wild flies to a level that can be overwhelmed by the sterile males (CDFA.CA.Gov/phpps/PDEP/treatment/medfly_treatment and CDFA.CA.Gov/phpps/IPC/pinkbollworm/pbm_hp).

Applicable to LBAM Eradication Program: Sterile moth release would be a useful tool against LBAM. More mass reared moths would be needed compared to the inherited sterility technique (see above).

Research Needed: Determine level of radiation needed to sterilize the LBAM, develop a method to mass rear LBAM, build the LBAM mass rearing facility, develop methods to ship and release the LBAM and field test the concept.

VII. Regulatory Control

Tool: Quarantines and Hold Notices

Efficacious against LBAM	no
Available Now	yes
Available March 2008	yes
Available September 2008	yes
Available 2009	yes

Available 2010 yes

Description of tool: Governments use quarantines and hold notices to prevent the human-aided movement of pests and/or items likely to harbor the pest into their jurisdiction or the movement of pests from infested areas into uninfested areas within their jurisdiction.

Examples of tool use: The CDFA maintains a number of quarantines exclude unwanted pests (CDFA.Ca.Gov/Regulations.html.LBAM#3). The Department also uses hold notices to prevent the intra-state movement of pests.

Applicable to LBAM Eradication Program: Regulatory actions only prevent the human-aided movement of unwanted pests. They do not reduce pest numbers or the ability of the pest to spread on its own. Regulatory actions alone cannot eradicate any pest or prevent their spread.

Research Needed: None

Table 1. Comparison of the Efficacy and Availability of Potential Eradication Program Tools.

Tool	Efficacious	Available now	Available March 08	Available September 08	Available 09	Available 10
Synthetic Insecticides	yes	yes	yes	yes	yes	yes
Botanical Insecticides	some	yes	yes	yes	yes	yes
Insect Growth Regulators	yes	yes	yes	yes	yes	yes
Insect Pathogens	yes	yes	yes	yes	yes	yes
Biopesticides	yes	yes	yes	yes	yes	yes
Inundative Releases	likely	no	possibly*	probably	yes	yes
Classical Biocontrol	likely	no	no	no	possibly*	probably
Mass Trapping	likely	yes	yes	yes	yes	yes
Pheromone Disruption	yes	yes	yes	yes	yes	yes
Attract and Kill	likely	no	possibly*	probably	yes	yes
Mobile Mating Disruption	unknown	no	no	no	possibly*	probably
Trap Plants	unlikely	no	no	no	no	no
Physical Removal	unlikely	yes	yes	yes	yes	yes
Host Removal	unlikely	yes	yes	yes	yes	yes
Repellents	possibly	yes	yes	yes	yes	yes
Inherited Sterility	possibly	no	no	no	possibly*	probably
Sterile Moth Release	probably	no	no	no	possibly*	probably
Integrated Pest Management	yes	yes	yes	yes	yes	yes
Quarantines and Hold Notices	no	yes	yes	yes	yes	yes

* assumes that the tool is shown to be effective